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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Appellant:	Thomas
Serial No.:	10/759,523
Filed:	January 16, 2004
Group Art Unit:	3683
Examiner:	King, Bradley T.
Title:	DISC BRAKE ASSEMBLY

Mail Stop Appeal Brief- Patents
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

APPEAL BRIEF

Dear Sir:

Subsequent to the filing of the Notice of Appeal on August 31, 2006, Appellant hereby submits its brief. The Commissioner is authorized to charge Deposit Account No. 50-1482 in the name of Carlson, Gaskey & Olds, P.C. $500.00 for the appeal brief fee. Any additional fees or credits may be charged or applied to Deposit Account No. 50-1482 in the name of Carlson, Gaskey & Olds, P.C.

REAL PARTY IN INTEREST

The real party in interest is ArvinMeritor Heavy Vehicle Braking Systems (UK) Limited, the assignee of the entire right and interest in this Application.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

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STATUS OF CLAIMS

Claims 1, 4-19 and 21 are pending in this application. Claims 1, 4-19 and 21 stand finally rejected under 103(a). Claims 2, 3 and 20 have been cancelled.

STATUS OF AMENDMENTS

All amendments have been entered. Appellant filed an amendment on July 27, 2006 that was entered for purposes of appeal. The Examiner withdrew the rejection of claims 1, 4-19 and 21 under 35 USC 112, first paragraph.

SUMMARY OF CLAIMED SUBJECT MATTER

As shown in Figures 5 and 7, this invention relates to a disc brake assembly 129 including a brake caliper 115 having an outboard side, a brake pad 131, and a substantially elongate pad spring 124 that defines a longitudinal direction and includes a spring planar region 170 (page 4, lines 2-6 and 11-13 and page 5, lines 6-9). The disc brake assembly 129 includes a pad retainer 126 including a retainer planar region positioned at a first radius R1 to restrain radial movement of the brake pad 131 and a crook 126A at an end of the retainer planar region (page 5, lines 24-26). The pad retainer 126 is secured to the outboard side of the brake caliper 115 at a second radius R2 that is less than the first radius R1 (page 5, lines 21-23). The spring planar region 170 engages the pad retainer 126, defining an engaging region of the spring planar region 170 (page 5, lines 5-7). A lateral edge region of the engaging region adjacent to the outboard side of the brake caliper 115 is defined by a laterally and downwardly extending lug having an upper surface defining a rounded edge 171 (page 5, lines 7-10). This basic structure is set forth in Independent Claim 1.

Independent claim 13 recites a disc brake assembly 129 including a brake caliper 115 having an outboard side, a brake pad 131 and a pad spring 124 including a spring planar region 170, radially outwardly curved ends 142 and an aperture 152. The pad spring 124 is substantially elongate and defines a longitudinal direction (page 4, lines 2-6 and 11-13 and page 5, lines 6-9). The disc brake assembly 129 includes a pad retainer 126 including a retainer planar region

positioned at a first radius R1 to restrain radial movement of the brake pad 131 and a crook 126A at an end of the retainer planar region (page 5, lines 24-26). The pad retainer 126 is secured to the outboard side of the brake caliper 115 at a second radius R2 that is less than the first radius R1 (age 5, lines 21-23). The spring planar region 170 engages the pad retainer 126 to define an engaging region of the spring planar region 170. A lateral edge region of the engaging region adjacent to the outboard side of the brake caliper 115 is defined by a laterally and downwardly extending lug having an upper surface defining a rounded edge 171 (page 5, lines 7-10). The disc brake assembly 129 also includes a backplate 134 including complementary curved surfaces 190 and a backplate protrusion 150 (page 4, lines 6-10). The radially outwardly curved ends 142 of the pad spring 124 radially retain the pad spring 124 on the backplate 134, and the complementary curved surfaces 140 of the backplate 134 abut the radially outwardly curved ends 142 of the pad spring 124 (page 4, lines 18-22). The backplate protrusion 150 of the backplate 134 is located in the aperture 152 of the pad spring 124 to prevent axial movement between the pad spring 124 and the backplate 134 (page 4, lines 18-22).

Independent claim 21 recites a method of making a disc brake assembly 129 including a brake caliper 115 having an outboard side, a brake pad 131 and a substantially elongate pad spring 124 that defines a longitudinal direction and includes a spring planar region 170 (page 4, lines 2-6 and 11-13 and page 5, lines 6-9). The disc brake assembly 129 includes a pad retainer 126 including a retainer planar region positioned at a first radius R1 to restrain radial movement of the brake pad 131 and a crook 126A at an end of the retainer planar region (page 5, lines 24-26). The pad retainer 126 is secured to the outboard side of the brake caliper 115 at a second radius R2 that is less than the first radius R1 (page 5, lines 21-23). The spring planar region 170 engages the pad retainer 126, defining an engaging region of the spring planar region 170 (page 5, lines 5-7). A lateral edge region of the engaging region adjacent to the outboard side of the brake caliper 115 is defined by a laterally and downwardly extending lug having an upper surface defining a rounded edge 171 9page 5, lines 7-10). The method includes the steps of stamping a pad spring blank from sheet metal to form the pad spring 124 including a laterally extending lug (page 4, lines 11-15),

performing a pressing operation to bend the laterally extending lug downwardly to provide the laterally and downwardly extending lug and to round the upper surface of the laterally and downwardly extending lug to form the rounded edge 171, and assembling the disc brake assembly 129 (page 6, lines 11-15).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Are Claims 1, 4-19 and 21 properly rejected under 35 U.S.C. 103(a) based on EP 0703378 (the European Reference) in view of Heinz et al. (US 4049087)?

ARGUMENTS

A. Obviousness of Claims 1, 4-19 and 21 based on the European Reference in view of Heinz et al.

Claims 1, 4-12, 14, 15 and 16-19

The Examiner finally rejected Claims 1, 4-12, 14, 15 and 16-19 as being obvious based on the European Reference in view of Heinz et al.

The present invention is patentable and strikingly different from the European Reference in view of Heinz et al. As described by the claims, the present invention provides a disc brake assembly including a substantially elongate pad spring defining a longitudinal direction that includes a spring planar region. The disc brake assembly also includes a pad retainer including a retainer planar region positioned at a first radius to restrain radial movement of a brake pad and a crook at an end of the retainer planar region. The pad retainer is secured to an outboard side of a brake caliper at a second radius that is less than the first radius. The spring planar region engages the pad retainer to define an engaging region of the spring planar region. A lateral edge region of the engaging region adjacent to the outboard side of the brake caliper is defined by a laterally and downwardly extending lug having an upper surface defining a rounded edge.

[See Claim 1]. Claims 1, 4-19 and 21 of the present invention all share these same or similar features. [See Claims 1, 4-9 and 21].

The Examiner admits that the European Reference does not disclose a lateral edge region of an engaging region of the pad spring that is adjacent to an outboard side of a brake caliper that is rounded as claimed. The Examiner states that Heinz et al. discloses this feature, and it would be obvious to include the legs 5 and 6 of Heinz et al. with the clip 18 of the European Reference to ensure proper retention and increase the security of the device. Appellant respectfully disagrees.

The claimed invention is not obvious. There is no motivation to employ lugs in the European Reference to ensure proper retention and increase the security of the device as the Examiner contends. The European Reference discloses a clip 18 retained to a backing plate 10 by the interaction of lugs 16 of the backing plate 10 and holes 20 in the clips 18. Heinz et al. includes a clip 1 having legs 5 and 6 that are bent to properly retain the clip 1 on a backing plate 8. The Examiner states in the Advisory Action mailed August 15, 2006 that the motivation of adding lugs to the European Reference is to add a greater degree of security and retention to the clip 18. Appellant respectfully disagrees.

The clip 18 of the European Reference is retained on the backing plate 10 by the lugs 16 and the holes 20. The holes 20 in the clip 18 in conjunction with the lugs 16 on the backing plate 10 adequately retain the clip 18 onto the backing plate 10. There is no reason to employ the legs 5 and 6 of Heinz et al. with the clip 18 of the European Reference as the lugs 16 and the holes 20 provide this feature. Therefore, there is no motivation to employ the additional lugs to secure the clip 18 to the backing plate 10 of the European Reference.

Adding the legs 5 and 6 of Heinz et al. to the clip 18 of the European Reference would also add an unnecessary cost. First, the clip 18 of the European Reference is manufactured by initially stamping out a blank which is then formed to provide the correct bends. The outside shape of the blank is rectangular. Therefore, when a series of blanks are made from a strip of sheet material, there is no waste because a right hand edge of the first blank naturally forms a left hand edge of the second blank, etc. As shown in Figure 4 of Heinz et al., a blank used to form the clip 1 including legs 5 and

6 would result in much material waste as subsequent clips 1 are stamped because of the space taken by the legs 5 and 6.

Second, Figure 1 of the European Reference shows that the clip 18 has a single curvature. For example, by forming the spring shape as shown in Figure 1 from a flat blank, all the bend lines are parallel and **transverse** to a longitudinal axis of the clip 18. However, if the legs 5 and 6 of Heinz et al. are added to the clip 18 of the European Reference, a separate bending operation would be needed because the bend lines for the legs 5 and 6 would be at right angles to the other bends within the clip 18. That is, the bend lines of the legs 5 and 6 are **longitudinal** to the general spring axis. Figures 3 and 3A of Heinz et al. show that the leg 6 is bent to form a "re-entrant" feature, i.e., it is bent more than 90 degrees. This type of bend is difficult, and therefore expensive, to produce.

Adding legs 5 and 6 to the clip 18 of the European Reference would provide additional cost (because of material waste, having to create bends both laterally and longitudinally relative to the clip 18 and having to produce a re-entrant bend) and would be redundant to the already provided lugs 16 and holes 20. Therefore, one skilled in the art would not add lugs to the European Reference.

Furthermore, the clip 18 of the European Reference is "universal" as it can be fitted to many different brake pads. The clip 1 of Heinz et al. can only be fitted to a brake pad having a backplate of a specific thickness because of the legs 5 and 6. Thus, in the European Reference, it is the width of the lugs 16 that determines if the clip 18 can be fitted. That is, it is possible to have a common lug width which is the same or different from the width of the backplate. Accordingly, the clip 18 of the European Reference can be fitted to brake pads having different backplate thicknesses. Because the legs 5 and 6 of Heinz et al. surround the backplate itself, the legs 5 and 6 must be spaced further apart for a thicker backplate, requiring a different clip 1. Accordingly, one skilled in the art would not add legs 5 and 6 to the "universal" spring of the European Reference features as this which would make that clip 18 less universal and increase the part count (i.e., inventory requirement) and hence increase cost.

Furthermore, using the legs 5 and 6 of Heinz et al. to secure the clip 18 to the backing plate 10 is a less preferred solution than using the arrangement shown in the European Reference. As

mentioned above, the leg 5 of Heinz et al. is bent 90 degrees, and the leg 6 is bent more than 90 degrees (approximately 130 degrees). When bending the legs 5 and 6 these large angles, there is a significant risk that small cracks will form in the material at the corners where the leg 5 and 6 meets the base section 4. In use, when the brakes are applied and released (and when the vehicle traverses bumpy ground), the legs 5 and 6 are subject to flexing forces. Over the life of the brake pad, there will be many thousands of applications of these flexing forces. The combination of many thousands of applications of a flexing force on the legs 5 and 6 which have the above mentioned small cracks can cause the legs 5 and 6 to fatigue and break off. Using lugs in the clip 18 of the European Reference could make the brake pad weaker.

Finally, the claimed invention solves problems of the prior art that are not solved by Heinz et al. The claimed invention prevents a pad spring from digging into a pad retainer. The legs 5 and 6 of Heinz et al. are employed for a different purpose, namely to retain the clip 1 on the backing plate 8. The legs 5 and 6 of Heinz et al. do not perform the same function as the claimed lugs, and the claimed invention solve problems presented in the prior art.

Claim 13

Claim 13 is not obvious in view of the European Reference and Heinz et al. It is not obvious to employ the legs 5 and 6 of Heinz et al. in the European Reference for the reasons set forth above in the argument section for claims 1, 4-12 and 14-19. The claimed invention is not obvious.

Claim 21

Claim 21 is not obvious in view of the European Reference and Heinz et al. It is not obvious to employ the legs 5 and 6 of Heinz et al. in the European Reference for the reasons set forth above in the argument section for claims 1, 4-12 and 14-19. The claimed invention is not obvious.

CONCLUSION

For the reasons set forth above, the rejection of all claims is improper and should be reversed. Appellant respectfully requests such an action.

Respectfully Submitted,

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Dated: October 31, 2006

CERTIFICATE OF FACSIMILE

I hereby certify that this appeal brief is being facsimile transmitted to the United States Patent and Trademark Office, 571-273-8300 on October 31, 2006.

Amy M. Spaulding

CLAIM APPENDIX

1. A disc brake assembly comprising:

a brake caliper having an outboard side;

a brake pad;

a pad spring including a spring planar region, wherein the pad spring is substantially elongate and defines a longitudinal direction; and

a pad retainer including a retainer planar region positioned at a first radius to restrain radial movement of the brake pad, wherein the pad retainer is secured to the outboard side of the brake caliper at a second radius that is less than the first radius, the pad retainer further including a crook at an end of the retainer planar region,

wherein the spring planar region engages the pad retainer, thereby defining an engaging region of the spring planar region, and

wherein a lateral edge region of the engaging region adjacent to the outboard side of the brake caliper is defined by a laterally and downwardly extending lug having an upper surface, wherein the upper surface defines a rounded edge.

4. The disc brake assembly according to claim 1 wherein the pad spring is substantially curved.

5. The disc brake assembly according to claim 1 further including a backplate, wherein the pad spring further includes radially outwardly curved ends that limit circumferential movement of the pad spring relative to the backplate.

6. The disc brake assembly according to claim 5 wherein the backplate includes complementary curved surfaces for abutment with the radially outwardly curved ends of the pad spring.

7. The disc brake assembly according to claim 1 further including a backplate having a backplate protrusion, wherein the pad spring further includes an aperture, and the backplate protrusion of the backplate is located in the aperture of the pad spring to prevent axial movement between the pad spring and the backplate.

8. The disc brake assembly according to claim 7 wherein the pad spring includes a spring protrusion located around the backplate to assist in preventing axial movement between the pad spring and the backplate.

9. The disc brake assembly according to claim 1 wherein the crook has a crook radius that allows the second radius to be less than the first radius, the crook radius is substantially equal to a lateral edge radius of the lateral edge region of the pad spring, and the lateral edge region of the pad spring is adjacent to the crook.

10. The disc brake assembly according to claim 9 wherein the crook radius is between 4.0 mm and 8.0 mm.

11. The disc brake assembly as related in claim 10 wherein the crook radius is between 5.0 mm and 7.0 mm.

12. The disc brake assembly as recited in claim 11 wherein the crook radius is between 5.25 mm and 6.75 mm.

13. A disc brake assembly comprising:

a brake caliper having an outboard side;

a brake pad;

a pad spring including a spring planar region, radially outwardly curved ends and an aperture, wherein the pad spring is substantially elongate and defines a longitudinal direction;

a pad retainer including a retainer planar region positioned at a first radius to restrain radial movement of the brake pad, wherein the pad retainer is secured to the outboard side of the brake caliper at a second radius that is less than the first radius, the pad retainer further including a crook at an end of the retainer planar region, wherein the spring planar region engages the pad retainer, thereby defining an engaging region of the spring planar region, and a lateral edge region of the engaging region adjacent to the outboard side of the brake caliper is defined by a laterally and downwardly extending lug having an upper surface, wherein the upper surface defines a rounded edge; and

a backplate including complementary curved surfaces and a backplate protrusion, wherein the radially outwardly curved ends of the pad spring radially retain the pad spring on the backplate and the complementary curved surfaces of the backplate abut the radially outwardly curved ends of the pad spring, and wherein the backplate protrusion of the backplate is located in the aperture of the pad spring to prevent axial movement between the pad spring and the backplate.

14. The disc brake assembly according to claim 1 wherein the brake caliper includes an inboard side, a second lateral edge region of the engaging region of the spring planar region adjacent to the inboard side of the brake caliper is defined by a second laterally and downwardly extending lug having a second upper surface, and the second upper surface defines a second rounded edge.

15. The disc brake assembly according to claim 1 wherein the pad spring is defined by a length and a width, and the engaging region of the spring planar region that engages the pad retainer defines a maximum width of the pad spring.

16. The disc brake assembly according to claim 15 wherein the pad spring includes longitudinal ends, and the longitudinal ends have a reduced width that is less than the maximum width.

17. The disc brake assembly as defined in claim 15 wherein the pad spring has a pad spring inboard side and a pad spring outboard side, and the maximum width of the pad spring is defined by the laterally and downwardly extending lug projecting from the pad spring outboard side and a second laterally and downwardly extending lug projecting from the pad spring inboard side.

18. The disc brake assembly as defined in claim 17 wherein the second laterally and downwardly extending lug is bent downwardly to provide a second lateral edge region of the engaging region of the spring planar region that engages the pad retainer.

19. The disc brake assembly as defined in claim 17 wherein the second laterally and downwardly extending lug provides a second lateral edge region.

21. A method of making a disc brake assembly including a brake caliper having an outboard side, a brake pad, a pad spring including a spring planar region that is substantially elongate and defines a longitudinal direction, and a pad retainer including a retainer planar region positioned at a first radius to restrain radial movement of the brake pad,

wherein the pad retainer is secured to the outboard side of the brake caliper at a second radius that is less than the first radius, the pad retainer further including a crook at an end of the retainer planar region, wherein the spring planar region engages the pad retainer, thereby defining an engaging region of the spring planar region, and a lateral edge region of the engaging region adjacent to the outboard side of the brake caliper is defined by a laterally and downwardly extending lug having an upper surface, wherein the upper surface defines a rounded edge, the method comprising the steps of:

stamping a pad spring blank from sheet metal to form the pad spring including a laterally extending lug;

performing a pressing operation to bend the laterally extending lug downwardly to provide the laterally and downwardly extending lug and to round the upper surface of the laterally and downwardly extending lug to form the rounded edge; and

assembling the disc brake assembly.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None

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